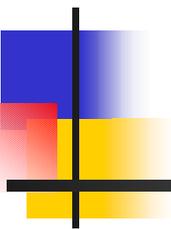


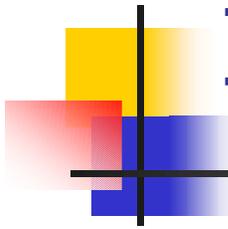
Impact of Vegetative Burning on PM_{2.5} Concentrations in the San Joaquin Valley



Richard J. Countess and Susan J. Countess
Countess Environmental, Westlake Village, CA

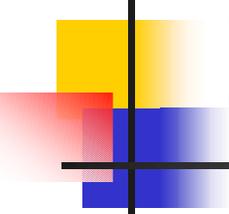
(work performed on behalf of the SJVAPCD)

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Introduction

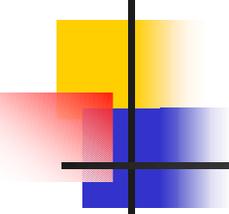
- This paper summarizes the contribution of vegetative burning to ambient PM_{2.5} concentrations in California's San Joaquin Valley for 25 sites using data from the California Regional Particulate Air Quality Study conducted between 12/1999 and 2/2001
- Soluble potassium was used as a unique chemical marker for ambient PM_{2.5} levels resulting from vegetative burning
- Source profiles for residential wood combustion and agricultural burning were used to calculate the contribution of vegetative burning to PM_{2.5} concentrations



Source profiles for residential wood combustion (RWC) and agricultural waste burning (Reference: Doug Lowenthal, Desert Research Institute)

- Major components of vegetative burning are organic and elemental carbon
- Soluble potassium (K_{veg}) is a unique chemical marker for vegetative burning
- Source profile for RWC = 2.93% K_{veg}
- Source profile for Ag Burning = 10% K_{veg}

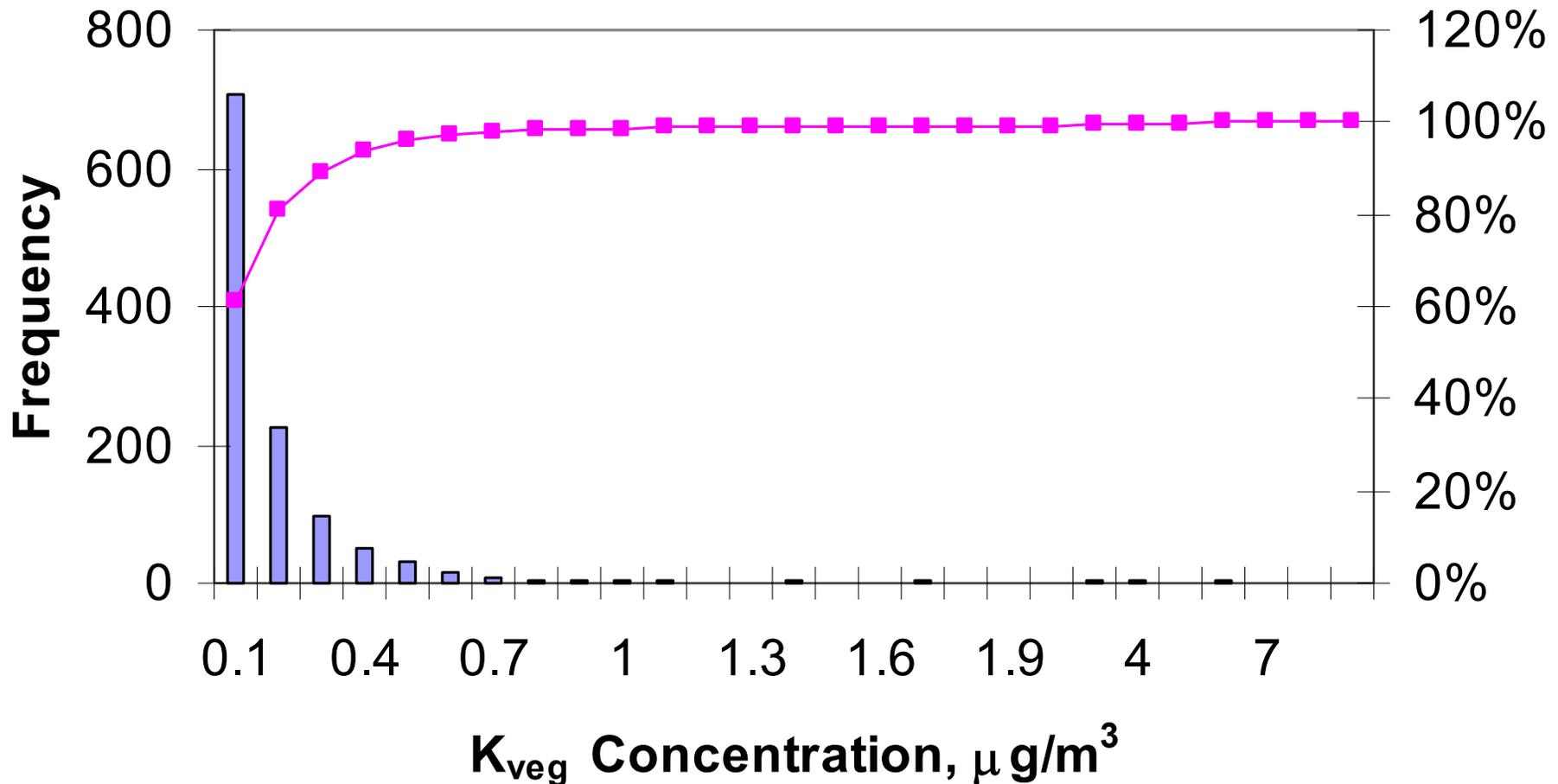
Thus: 1 $\mu\text{g}/\text{m}^3$ of K_{veg} is associated with 34 $\mu\text{g}/\text{m}^3$ of PM_{2.5} mass if the source is RWC and 10 $\mu\text{g}/\text{m}^3$ of PM_{2.5} mass if the source is agricultural burning



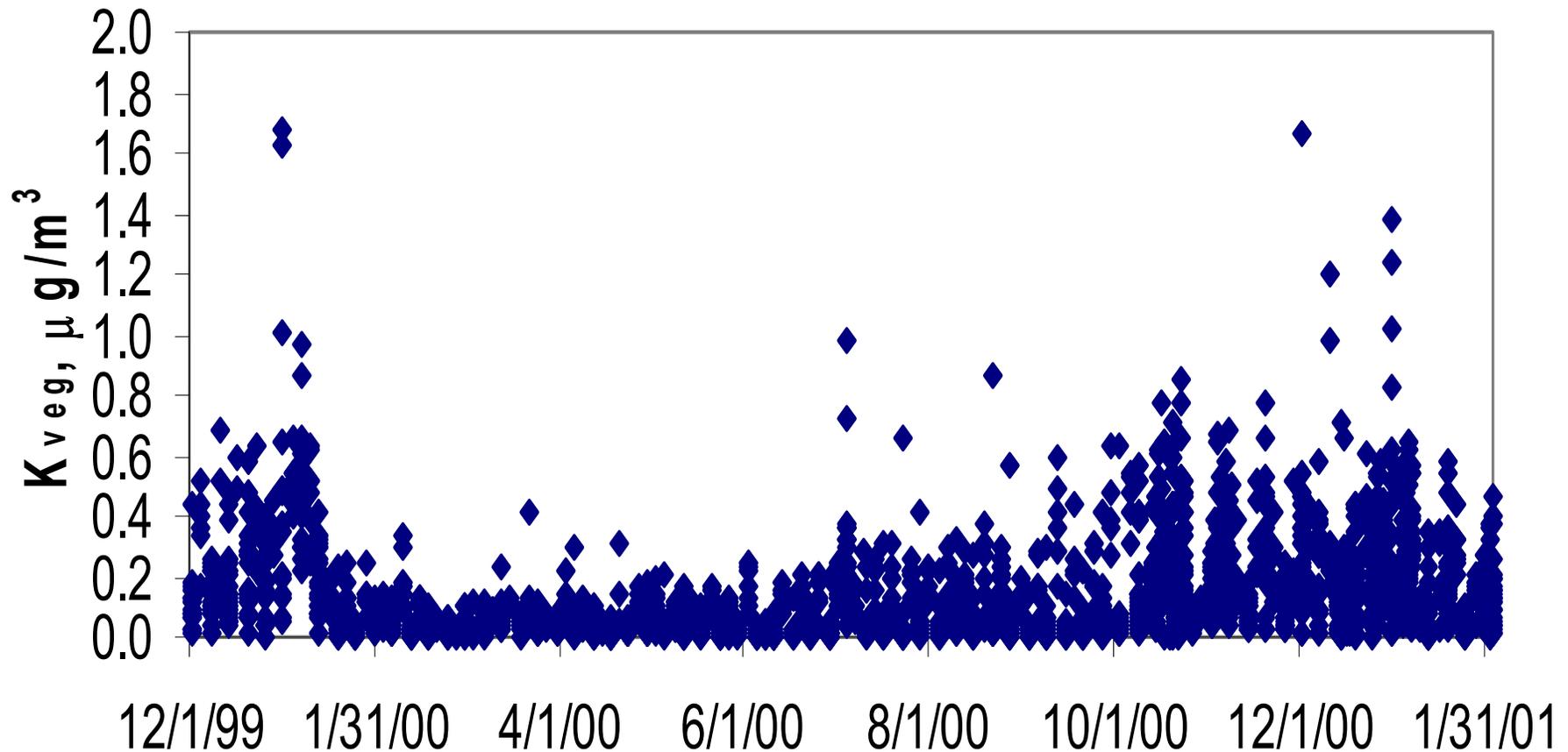
Assumptions

- Vegetative burning produces aerosol in the PM_{2.5} size fraction
- K_{veg} on the District's "no burn" days is from RWC
- K_{veg} on "burn" days is from agricultural burning
- Wildfires and prescribed fires had a minimal impact on PM_{2.5} concentrations in the SJV during CRPAQS
- Average daily PM_{2.5} emissions from agricultural burning on a "burn" day in Fresno County is 10 tons. This is equivalent to 40,000 households burning 30 pounds of firewood in an evening (Reference: AP-42)

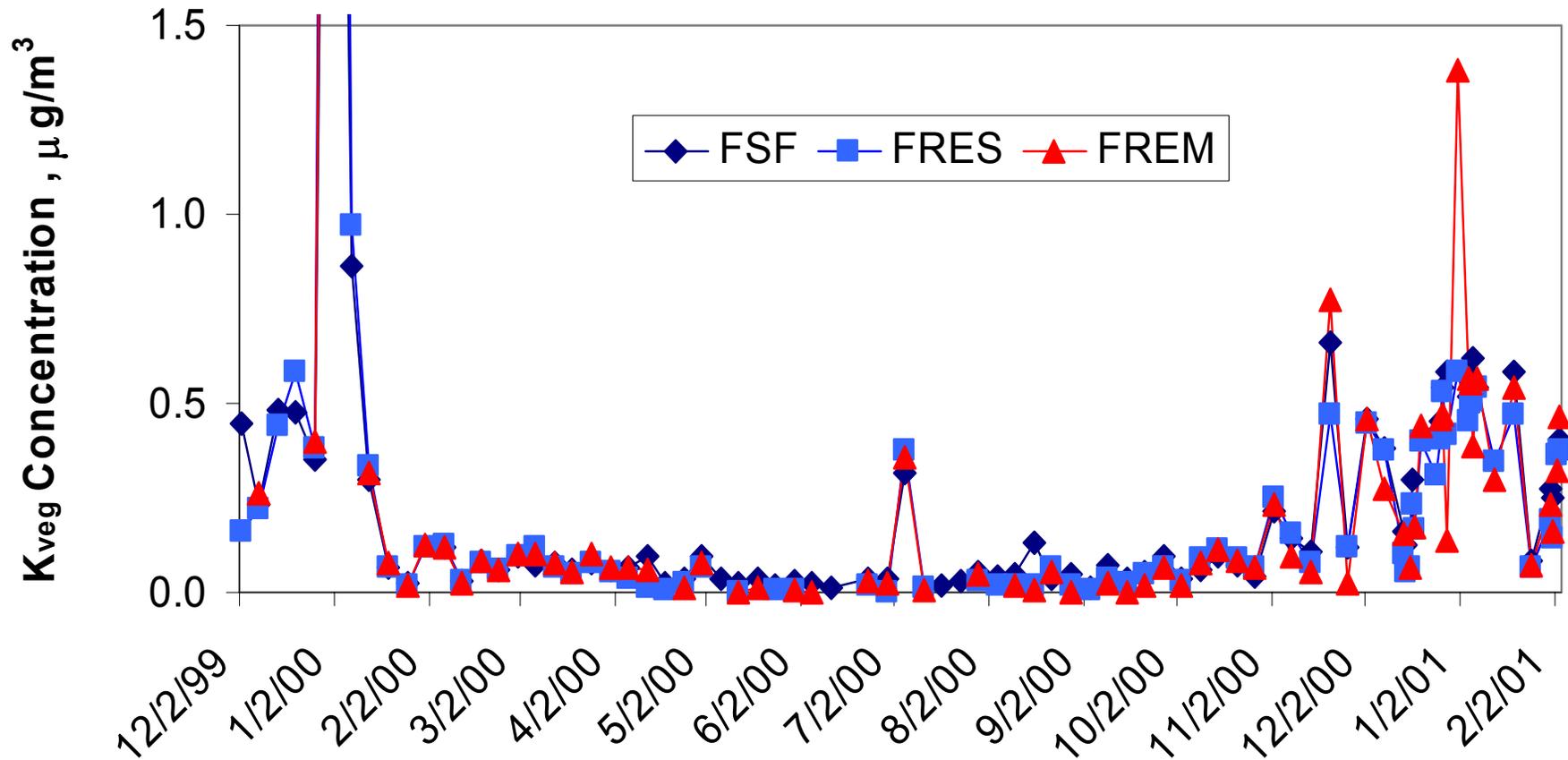
K_{veg} concentrations in the SJVAB are log-normally distributed, similar to most other air pollutants



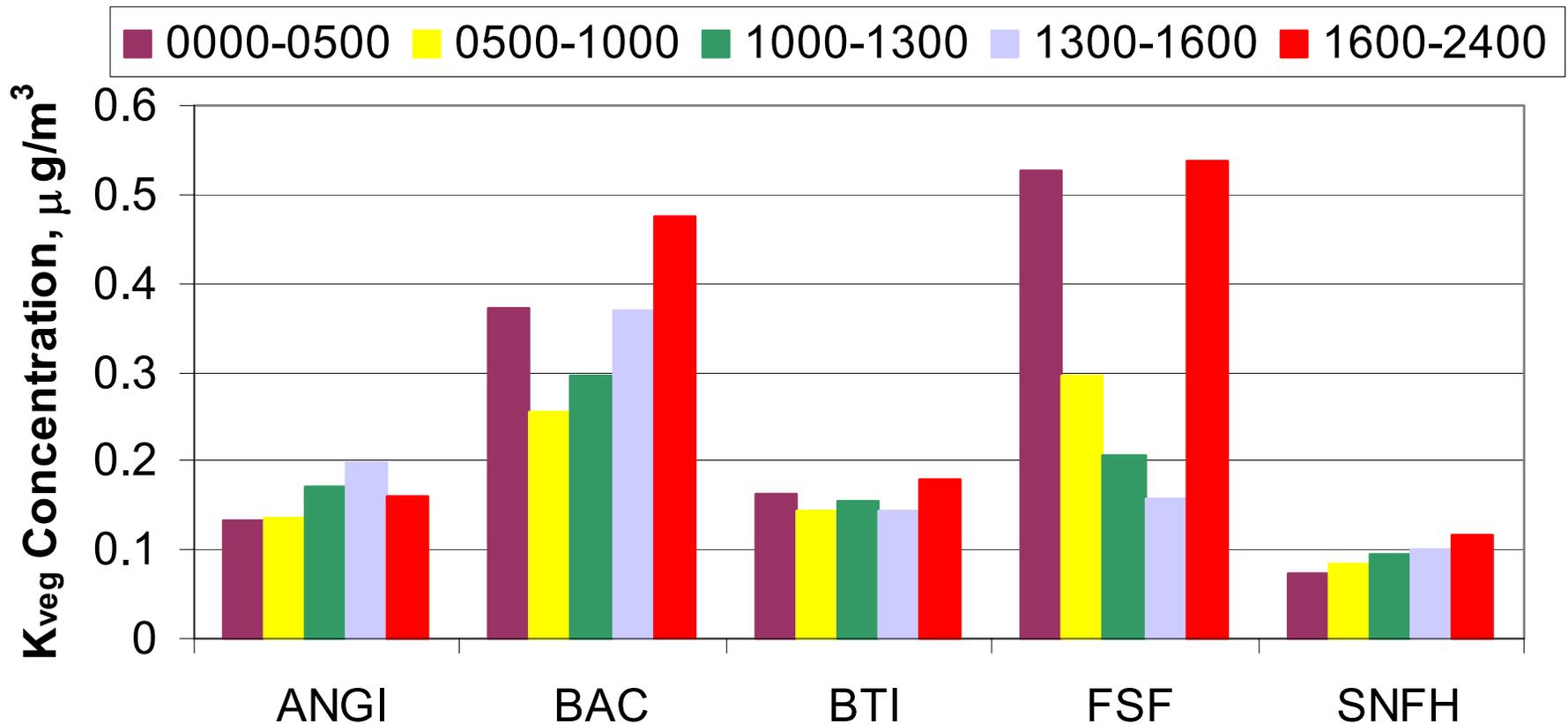
K_{veg} concentrations in the SJVAB show a large temporal variation over the 14-month study
(Note: chart excludes values of 3-8 $\mu\text{g}/\text{m}^3$ on 1/01/00)



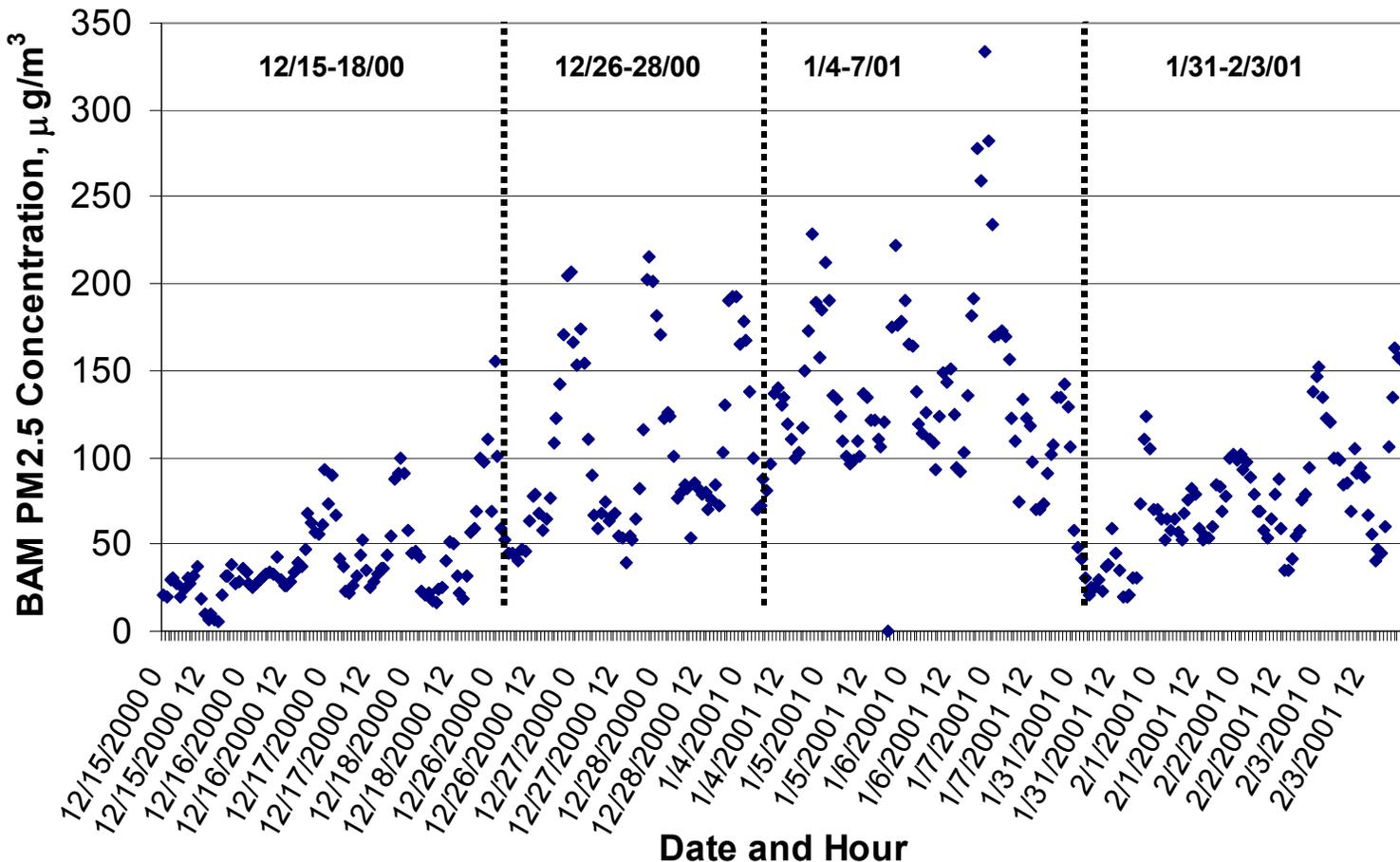
K_{veg} concentrations at three Fresno sites show large temporal variation and small spatial variation



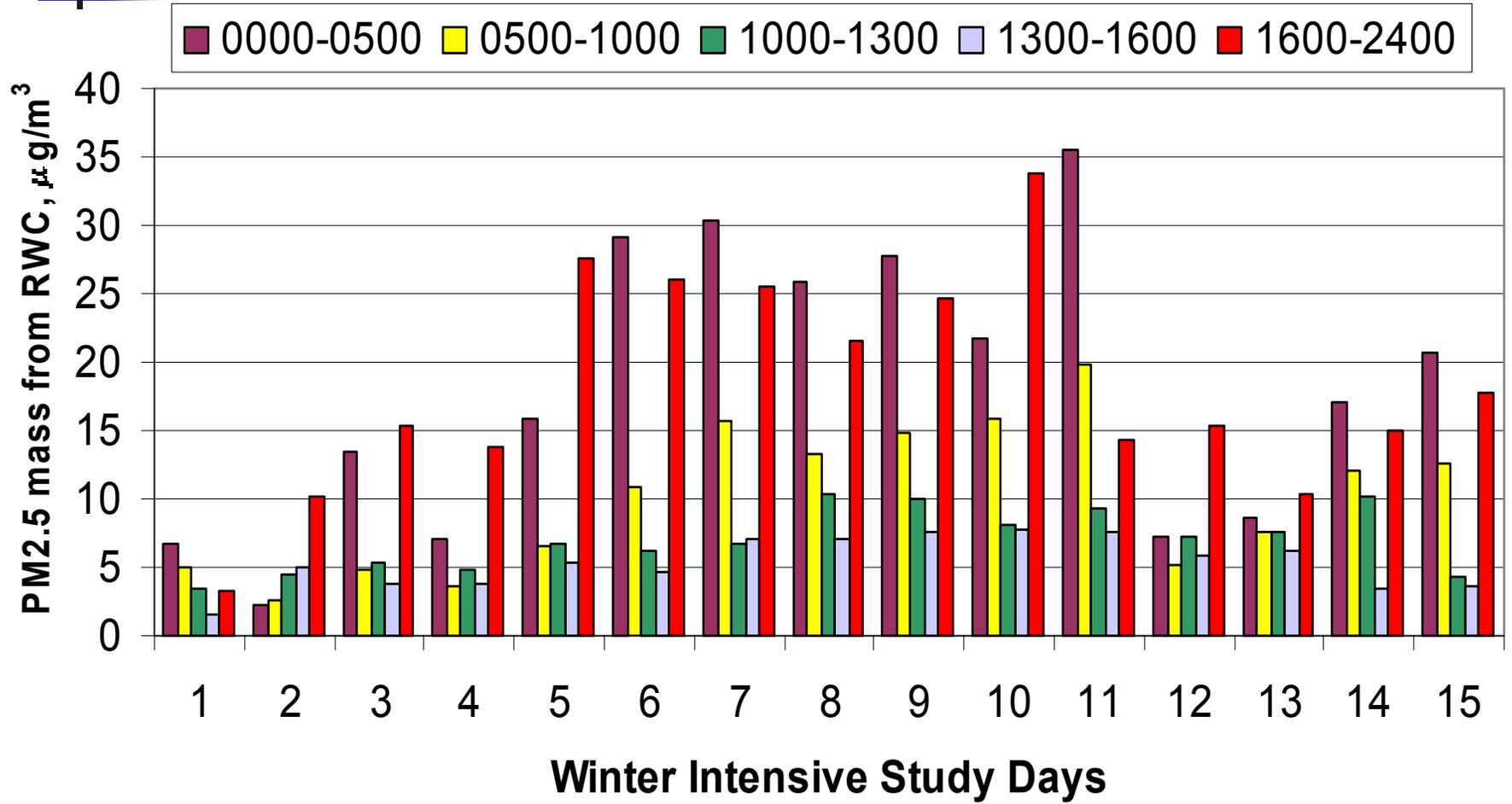
K_{veg} concentrations during the Winter Intensive show large temporal and spatial variations



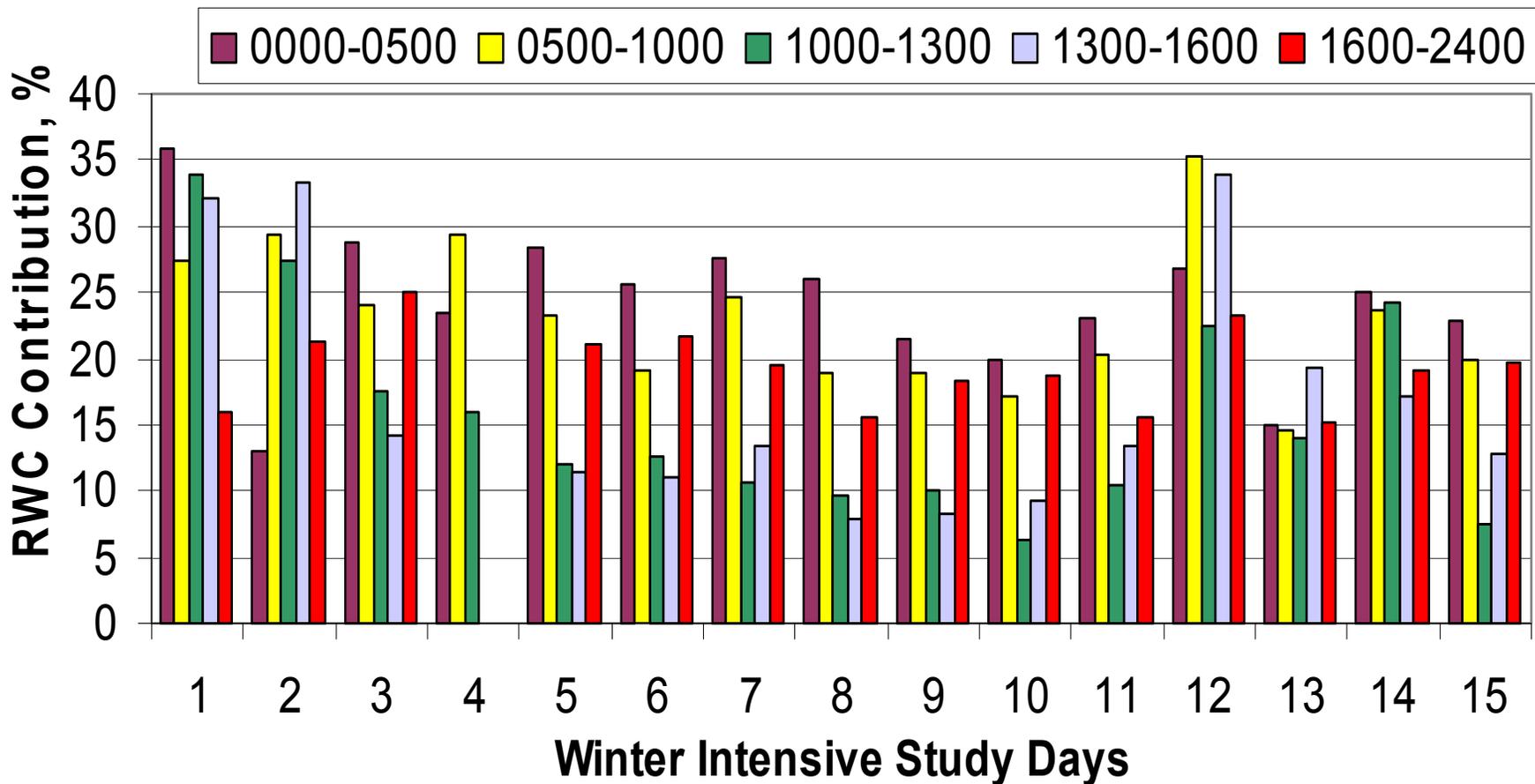
BAM PM2.5 measurements at Fresno during the Winter Intensive show large temporal variation



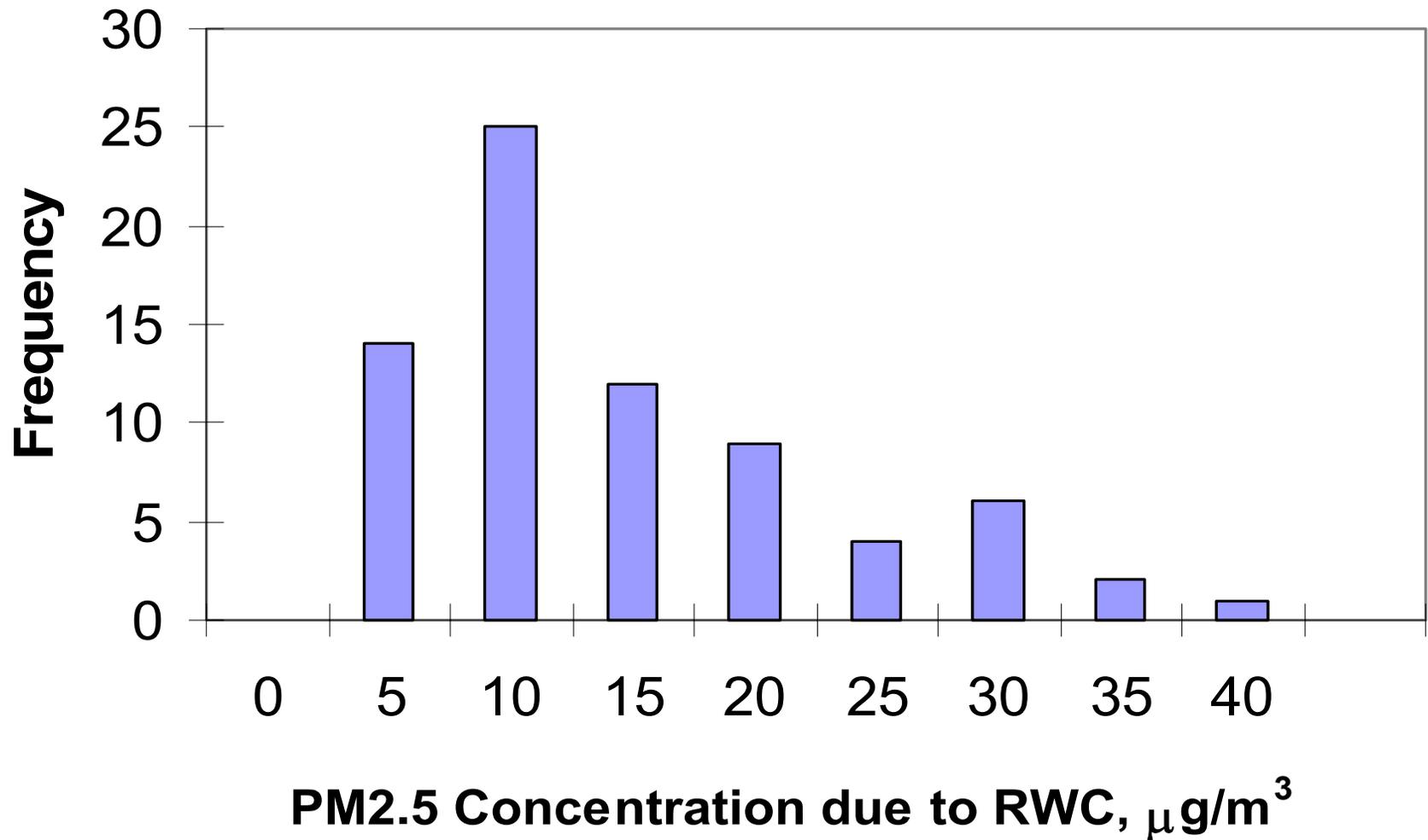
PM2.5 concentrations due to RWC at Fresno site during the Winter Intensive show large diurnal variation; highest between 4 PM and 5 AM



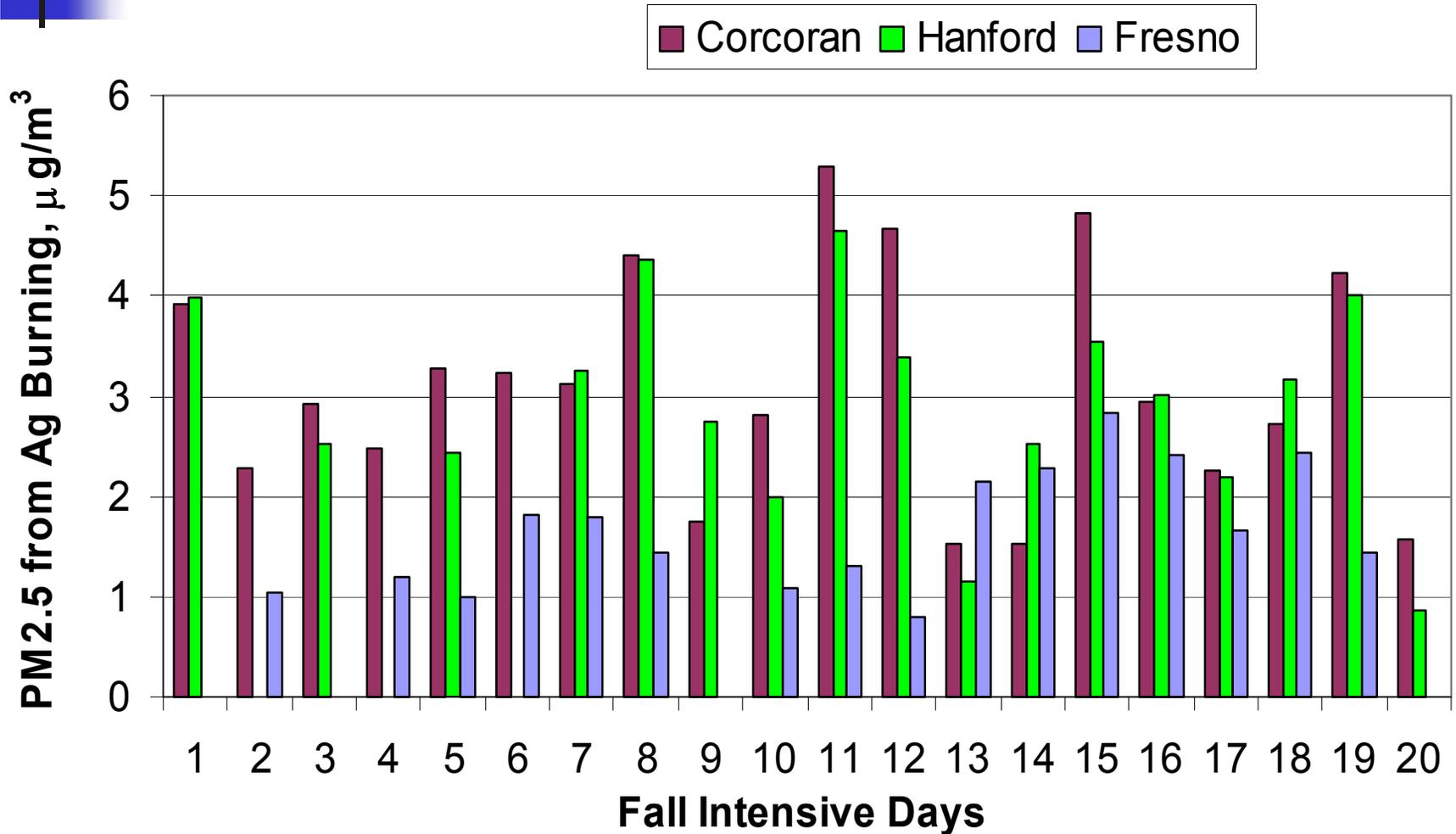
Residential wood combustion contribution to PM2.5 mass at Fresno site during the Winter Intensive shows large temporal variation

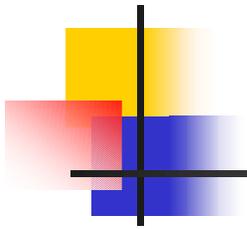


RWC contribution to PM2.5 concentrations at the Fesno site during the Winter Intensive are log-normally distributed



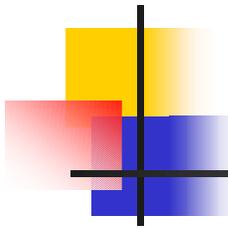
Agricultural burning contribution to PM_{2.5} for two sites in Kings County and one in Fresno County during Fall Intensive shows large spatial variation





Conclusions

- Large spatial and temporal variations in PM_{2.5} mass due to veg. burning. Highest PM_{2.5} conc. due to veg. burning resulting from ag. burning in fall and RWC in winter
- Avg. 24-hr PM_{2.5} conc. due to veg. burning is 3.6 $\mu\text{g}/\text{m}^3$, representing 11% of the PM_{2.5} mass concentration
- Avg. PM_{2.5} conc. due to veg. burning for 5 sites with diurnal measurements during the Winter Intensive ranged from 3.2 $\mu\text{g}/\text{m}^3$ at Sierra Nevada Foothills & Bethel Island, to 4.9 $\mu\text{g}/\text{m}^3$ at Angiola, to 11.0 $\mu\text{g}/\text{m}^3$ at Bakersfield & Fresno. These concentrations represent 13% of the PM_{2.5} mass at Angiola & Bethel Island, 18% at Bakersfield & Fresno, and 22% at Sierra Nevada Foothills



Conclusions (continued)

- Highest contribution to PM_{2.5} from veg. burning for all diurnal records during the Winter Intensive was 72%; avg. was 19%
- Little diurnal variation in PM_{2.5} mass due to veg. burning at two rural sites (ANGI and SNFH) and transport corridor site (BTI) during the Winter Intensive
- On the other hand, the two urban sites (BAC and FSF) show a large diurnal variation in PM_{2.5} mass due to veg. burning with the highest concentrations between 4 PM and 5 AM, which is consistent with RWC being the primary source of veg. burning